

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously presented) A liquid crystal display device comprising
a first substrate, a second substrate, and a vertical alignment type liquid crystal layer including liquid crystal molecules having negative dielectric anisotropy disposed between the first substrate and the second substrate, the liquid crystal display device being a vertical alignment type display wherein in an off state liquid crystal molecules of the liquid crystal layer are aligned substantially vertical and at least one vertical alignment film is provided for so aligning the liquid crystal molecules in the substantially vertical manner in the off state;
the device having a plurality of picture-element regions each defined by a first electrode placed in the first substrate on the side facing the liquid crystal layer and a second electrode placed in the second substrate to oppose to the first electrode via the liquid crystal layer,
in each of the plurality of picture-element regions, the liquid crystal layer having a plurality of liquid crystal regions different in the direction in which liquid crystal molecules tilt when a voltage is applied between the first electrode and the second electrode,
wherein at least one of the first substrate and the second substrate has a light-shield layer overlapping at least part of boundary region defined as regions separating the plurality of liquid crystal regions from each other,
the at least part of boundary region overlapping the light-shield layer is a region permitting liquid crystal molecules surrounding the region to tilt so that ends of the liquid crystal molecules closer to the substrate having the light-shield layer go away from the boundary region

in the area where the boundary region overlaps the light-shielding layer when a voltage is applied between the first electrode and the second electrode;

wherein at least one of the first electrode and the second electrode has at least one opening defined therein;

a protrusion in the boundary region for causing the liquid crystal molecules to tilt, and wherein the protrusion and the light-shielding layer overlap one another but are on opposite substrates; and

wherein a depth D of the light-shielding layer satisfies a relationship $D + T_3/2 = \sqrt{3} \times P/2$, where D is a depth of the light-shielding layer, T_3 is a thickness of the liquid crystal layer, and P is a pitch of an arrangement of at least some of the protrusions and openings.

2. (Original) The liquid crystal display device of claim 1, wherein the light-shield layer is placed with a predetermined spacing from the liquid crystal layer.

3. (Canceled)

4. (Original) The liquid crystal display device of claim 1, wherein at least one of the first substrate and the second substrate has at least one protrusion having a slant side formed on the surface facing the liquid crystal layer, and the direction in which liquid crystal molecules tilt in each of the plurality of liquid crystal regions is defined by orientation-regulating force of the at least one protrusion.

5. (Previously presented) The liquid crystal display device of claim 1, wherein the direction in which liquid crystal molecules tilt in each of the plurality of liquid crystal regions is defined by an inclined electric field generated at an edge portion of the at least one opening when a voltage is applied between the first electrode and the second electrode.

6. (Previously presented) The liquid crystal display device of claim 1, wherein at least one of the first substrate and the second substrate has at least one protrusion having a slant side formed on the surface facing the liquid crystal layer, and

the direction in which liquid crystal molecules tilt in each of the plurality of liquid crystal regions is defined by orientation-regulating force of the at least one protrusion and an inclined electric field generated at an edge portion of the at least one opening when a voltage is applied between the first electrode and the second electrode.

7. (Original) The liquid crystal display device of claim 1, wherein the first substrate further includes switching elements respectively placed to correspond to the plurality of picture-element regions, and

the first electrode comprises a plurality of picture-element electrodes respectively placed for the plurality of picture-element regions and switched with the switching elements, and the second electrode comprises at least one counter electrode opposed to the plurality of picture-element electrodes.

8. (Previously presented) A liquid crystal display device comprising a first substrate, a second substrate, and a vertical alignment type liquid crystal layer including liquid crystal

molecules having negative dielectric anisotropy disposed between the first substrate and the second substrate,

the device having a plurality of picture-element regions each defined by a first electrode placed in the first substrate on the side facing the liquid crystal layer and a second electrode placed in the second substrate to oppose to the first electrode via the liquid crystal layer,

in each of the plurality of picture-element regions, the liquid crystal layer having a plurality of liquid crystal regions different in the direction in which liquid crystal molecules tilt when a voltage is applied between the first electrode and the second electrode,

the plurality of liquid crystal regions of the liquid crystal layer including a first liquid crystal region of which the retardation value for light incident on the liquid crystal layer obliquely in a direction oblique from the normal to the liquid crystal layer increases with rise of an applied voltage and a second liquid crystal region of which the retardation value first decreases and then increases, at least one of the first and second liquid crystal regions being V-shaped,

protrusions for causing the liquid crystal molecules to tilt, and wherein at least one of the first electrode and the second electrode has at least one opening defined therein;

wherein the device comprises a light-shield layer selectively shading the first liquid crystal region, but not the second liquid crystal region, when the device is observed in the direction oblique from the normal to the display plane; and

wherein a depth D of the light-shield layer satisfies a relationship $D + T_3/2 = \sqrt{3} \times P/2$, where D is a depth of the light-shield layer, T_3 is a thickness of the liquid crystal layer, and P is a pitch of an arrangement of the protrusions and openings.

9. (Canceled)

10. (Original) The liquid crystal display device of claim 8, wherein at least one of the first substrate and the second substrate has at least one protrusion having a slant side formed on the surface facing the liquid crystal layer, and the direction in which liquid crystal molecules tilt in each of the plurality of liquid crystal regions is defined by orientation-regulating force of the at least one protrusion.

11. (Previously presented) The liquid crystal display device of claim 8, wherein the direction in which liquid crystal molecules tilt in each of the plurality of liquid crystal regions is defined by an inclined electric field generated at an edge portion of the at least one opening when a voltage is applied between the first electrode and the second electrode.

12. (Original) The liquid crystal display device of claim 8, wherein at least one of the first substrate and the second substrate has at least one protrusion having a slant side formed on the surface facing the liquid crystal layer,

at least one of the first electrode and the second electrode has at least one opening, and the direction in which liquid crystal molecules tilt in each of the plurality of liquid crystal regions is defined by orientation-regulating force of the at least one protrusion and an inclined electric field generated at an edge portion of the at least one opening when a voltage is applied between the first electrode and the second electrode.

13. (Original) The liquid crystal display device of claim 8, wherein the first substrate further includes switching elements respectively placed to correspond to the plurality of picture-element regions, and

the first electrode comprises a plurality of picture-element electrodes respectively placed for the plurality of picture-element regions and switched with the switching elements, and the second electrode comprises at least one counter electrode opposed to the plurality of picture-element electrodes.

14-19. (Canceled)

20. (Previously presented) The liquid crystal display device of claim 1, further comprising a pair of polarizing plates placed opposing to each other via the liquid crystal layer so that their polarization axes are substantially perpendicular to each other,

wherein in each of the plurality of picture-element regions, at least one of the first substrate and the second substrate has an additional light-shield layer overlapping at least part of regions in which liquid crystal molecules tilt in directions substantially parallel to the polarization axes of the pair of polarizing plates when a voltage is applied between the first electrode and the second electrode.

21. (Previously presented) The liquid crystal display device of claim 8, further comprising a pair of polarizing plates placed opposing to each other via the liquid crystal layer so that their polarization axes are substantially perpendicular to each other,

wherein in each of the plurality of picture-element regions, at least one of the first substrate and the second substrate has an additional light-shield layer overlapping at least part of regions in which liquid crystal molecules tilt in directions substantially parallel to the polarization axes of the pair of polarizing plates when a voltage is applied between the first electrode and the second electrode.

22. (Previously presented) A liquid crystal display device comprising
a first substrate, a second substrate, and a vertical alignment type liquid crystal layer including liquid crystal molecules having negative dielectric anisotropy disposed between the first substrate and the second substrate, the liquid crystal display device being a vertical alignment type display wherein in an off state liquid crystal molecules of the liquid crystal layer are aligned substantially vertical and at least one vertical alignment film is provided for so aligning the liquid crystal molecules in the substantially vertical manner in the off state;

protrusions for causing the liquid crystal molecules to tilt;

the device having a plurality of picture-element regions each defined by a first electrode placed in the first substrate on the side facing the liquid crystal layer and a second electrode placed in the second substrate to oppose to the first electrode via the liquid crystal layer, wherein at least one of the first electrode and the second electrode has at least one opening defined therein;

in each of the plurality of picture-element regions, the liquid crystal layer having a plurality of liquid crystal regions different in the direction in which liquid crystal molecules tilt when a voltage is applied between the first electrode and the second electrode,

a plurality of V-shaped boundary regions in a picture-element region, the V-shaped boundary regions separating the plurality of liquid crystal regions from each other, and wherein at least one of the first substrate and the second substrate has at least one light-shield layer overlapping a plurality of said V-shaped boundary regions, and

where each V-shaped boundary region overlapping the light-shield layer(s) is a region permitting liquid crystal molecules surrounding the region to tilt so that ends of the liquid crystal molecules closer to the substrate having the light-shield layer go away from the boundary region in the area where the boundary region overlaps the light-shielding layer when a voltage is applied between the first electrode and the second electrode; and

wherein a depth D of the light-shield layer satisfies a relationship $D + T_3/2 = \sqrt{3} \times P/2$, where D is a depth of the light-shield layer, T_3 is a thickness of the liquid crystal layer, and P is a pitch of an arrangement of the protrusions and openings.

23. (Previously presented) A liquid crystal display device comprising a first substrate, a second substrate, and a vertical alignment type liquid crystal layer including liquid crystal molecules having negative dielectric anisotropy disposed between the first substrate and the second substrate, the liquid crystal display device being a vertical alignment type display wherein in an off state liquid crystal molecules of the liquid crystal layer are aligned substantially vertical and at least one vertical alignment film is provided for so aligning the liquid crystal molecules in the substantially vertical manner in the off state;

the device having a plurality of picture-element regions each defined by a first electrode placed in the first substrate on the side facing the liquid crystal layer and a second electrode placed in the second substrate to oppose to the first electrode via the liquid crystal layer, wherein

at least one of the first electrode and the second electrode has at least one opening defined therein;

protrusions for causing the liquid crystal molecules to tilt;

in each of the plurality of picture-element regions, the liquid crystal layer having a plurality of liquid crystal regions different in the direction in which liquid crystal molecules tilt when a voltage is applied between the first electrode and the second electrode,

a plurality of substantially parallel boundary regions in a picture-element region, the boundary regions separating the plurality of liquid crystal regions from each other, and wherein at least one of the first substrate and the second substrate has at least one light-shield layer overlapping each of a plurality of said substantially parallel boundary regions, and

where each boundary region overlapping the light-shield layer(s) is a region permitting liquid crystal molecules surrounding the region to tilt so that ends of the liquid crystal molecules closer to the substrate having the light-shield layer go away from the boundary region in the area where the boundary region overlaps the light-shielding layer when a voltage is applied between the first electrode and the second electrode; and

wherein a depth D of the light-shield layer satisfies a relationship $D + T_3/2 = \sqrt{3} \times P/2$, where D is a depth of the light-shield layer, T_3 is a thickness of the liquid crystal layer, and P is a pitch of an arrangement of the protrusions and openings.

24. (Previously presented) The display device of claim 23, wherein the substantially parallel boundary regions in a picture element region are V-shaped.

25. (Previously presented) The display device of claim 1, wherein the boundary region is V-shaped.

26. (Canceled)